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AUTHOR House, Jess E.; And Others
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ABSTRACT

Because the amount of state-equalization aid received by Ohio school districts is inevitably related to district wealth, the measure of district ability is a concern. This paper presents findings of a study that used computer simulation to examine the effect of proposed modifications to district-revenue capacity on the equity of Ohio foundation-aid allocation. The paper first reviews the Ohio public-school funding system and recent policy initiatives in the state. Two modifications to measure district-revenue capacity have been proposed: (1) include income as part of local capacity in the state-aid formula; and (2) remove nonresidential property from local capacity. Data on each of the school districts for fiscal year 1987 were obtained from the Ohio Department of Education. Findings indicate that the substitutions for the present definition of revenue capacity resulted in greater equality of local revenue capacity. When income- or pooled-property simulations were used to replace assessed valuation, equity improved. A conclusion is that assessed valuation of property is the least desirable definition of local revenue capacity. Modifications to the present definition of local revenue capacity lead to small but significant increases in the equity of state-aid distributions. (LMI)

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A Simulation to Determine the Effect of Modifying Local Revenue Capacity

Jess E. House, Steven J. Weiss, and James Cozad

University of Toledo

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A Simulation to Determine the Effect of Modifying District Revenue Capacity

The educational services provided to public school students are largely supported by tax revenues collected by state and local government. A growing number of school districts in Ohio are unable to achieve adequate growth in revenues to maintain existing programs. Consequently, policy makers are concerned about the limitations of the property tax as a source of local revenue and as the basis for state equalization. Because the amount of state equalization aid received by a district is inversely related to district wealth, the measure of district ability is of added importance (Webb, McCarthy, & Thomas, 1988, p. 114). Through the use of a computer simulation, this study examines the effect of modifications to district revenue capacity on the equity of the allocation of Ohio foundation aid. The discussion includes a review of the Ohio public school funding system, recent policy initiatives in Ohio, the method employed in simulating the state aid formula, the revenue and equity effects of the simulations, and conclusions.

Ohio Public School Funding System

The funding arrangement in Ohio is often described as a partnership between state and local government. The bulk of revenues obtained by the state treasury come from sales tax and income tax, and the 615 school districts in the state receive local tax revenue from real and personal property located within their boundaries.

The Ohio state aid formula is a modified Strayer-Haig foundation formula. The state legislature sets a foundation level. The measure of local revenue capacity used in the formula is total assessed valuation of district real and personal property. Basic state aid is determined by finding the difference, if any, between the local revenue obtained from a required 20-mill levy and the foundation level times the number of pupils. Districts with lower property valuation receive more foundation aid, and those with higher valuation receive less.

Some districts are eligible for additional aid in the form of Disadvantaged Pupil Impact Aid (DPIA). Incidentally, because districts qualify for DPIA only if they have a sufficient number or percentage of pupils receiving Aid to Dependent Children payments, this aspect of the Ohio formula associates the amount of state aid with levels of income. The other major component of additional state funding is supplemental funding for vocational and special educational programs.

According to the foundation formula, districts that receive tax revenues greater than the foundation amount from the required 20 mill levy receive no basic state aid. However, a so-called "guarantee" provision in the Ohio state funding formula provides that districts be paid the larger of two values, either the difference between the foundation level and local revenue (as described above) or the amount from the previous year times a percentage increase. Because the guarantee provision largely obscures the effect of changes in

local revenue capacity for the approximately 250 school districts so affected, it was not included in the state aid formula used for the simulations.

Besides state aid, districts receive local revenue from the 20 mills levied against district assessed valuation and additional millage approved by the voters. On the average, districts in Ohio received $3,412 in revenue per pupil from state and local sources during FY89. State aid represented approximately 50% of the total (Ohio Public Expenditure Council, 1988).

Property values and income are not always highly correlated (Thornton, 1981). Because district income levels are not included in the present formula, districts with low property valuations and high income levels receive high levels of foundation aid. Conversely, districts with high property valuations and low income levels receive low levels of foundation aid.

The ability of school districts in Ohio to obtain increased local revenue was sharply curtailed by legislation approved in 1976. The enactment of H.B. 920 effectively prevents school districts from receiving increased revenues as a result of inflationary increases in real property values. In brief, the law provides that the voted millage rate be adjusted following the triennial reassessment of property, so that tax revenue remains constant. Despite the millage reduction effect of H.B.920, school districts receive some local revenue growth because non-voted millage is not affected by H.B. 920. Also, because the H.B. 920 tax adjustment factors apply only to real property, millage levied against personal tangible property tax is not reduced.

However, legislation that limited the growth of revenues from personal property soon followed. H.B. 291, passed in 1984, provided for a one percent annual reduction in the assessment rate of personal tangible property until the rate reaches 25% in 1992. As an example, personal tangible property valued at $100 had a taxable value of $33 in 1984: but in 1992, property of the same market value will have a taxable value of only $25. The combination of real property millage adjustments and personal property assessment reductions have resulted in little or no local revenue growth for many Ohio school districts.

Aside from the legislated restrictions cited above, the chief problem with using property tax as the source of district revenue stems from the uneven distribution of industrial and commercial properties (Benson, 1978). Ohio districts can be differentiated into groups based upon irregular occurence of property. First, there are districts that are property-rich and have ample local revenues. Other districts, although less well-endowed with property, are able to win the needed votes in support of property tax levy increases. Too, districts with new property (e.g., housing developments, shopping centers, power plants, increased inventories) added to their tax rolls experience local revenue growth. The remaining districts depend entirely on state aid to meet rising costs. When state aid is not sufficient to balance revenues with expenditures and voters are not willing to increase their property taxes, school districts are soon in serious financial difficulty. The importance of

local revenue to district fiscal health is underscored in Ohio because of static state revenue projections and an unfavorable climate for increased state taxes.

One barometer of the fiscal health of Ohio school districts is the number of districts that make application to the state's Emergency School Advancement Fund (ESAF). The ESAF acts as a lender of last resort to financially troubled districts. The fund was created following the temporary closing of large numbers of school districts during a period of fiscal crisis in the seventies. Districts are now required to to apply for a loan from the ESAF rather than close their doors. Thirty-seven Ohio school districts have been approved for ESAF loans in 1989, the highest number of loan recipients in eight years (OEA, 1989).

Policy Recommendations Under Discussion

An array of influential actors on the policy-making stage have expressed concern over the diminished revenue capacity of Ohio districts. The State Board of Education, legislators, appointed commissions, the governor, and associations representing teachers, school business officials, and superintendents have recommended including income as part of the system of financing public schools. Ohio considered inclusion of an income factor as a measure of fiscal capacity in the seventies (Odden, 1978). With the inflationary growth of property tax revenues blocked by H.B.920, proposals for

either school district voter-approved income taxes or the inclusion of an income factor in the state aid formula were made.

In 1981 and again in 1989, Ohio passed legislation that allowed school districts to levy a voter-approved local residential income tax. The 1981 bill was rescinded after two years; however, six districts passed income tax levies, and five of them continue in effect. S.B.28 (1989) once more authorizes school boards to submit local income tax options to district voters.

The latter proposal, inclusion of an income factor in the state aid formula, has been a recurring recommendation, but has not been passed into law. Edlefson (1983) contended that the ability of a school district to pass new property tax levies is clearly related to average household income and that an income factor in the formula would help to achieve equalization. The 1986 Ohio Blue Ribbon Commission on School Finance recommended that the implications and mechanisms of adding an income factor to the foundation formula be investigated. The commission reasoned that fiscal ability was tied to "personal income wealth" as well as property wealth. In the recommendations made to the legislature for the FY 1988-89 biennial funding bill, the State Board of Education advocated that a "uniform, statewide, school district income tax" be "collected by the state and returned to the school district of origin." Districts would receive revenue growth from the income tax as personal income within the district grew (State Board, 1986).

Another proposal that recurs in discussions of Ohio's school finance system more directly concerns the irregular distribution of property. For example, Edlefson (1983) recommended the statewide taxation of real and personal property other than residential and agricultural as a means of significantly reducing the wealth-caused disparities in school district resources. More recently, in a public address during August 1988, Justice Douglas of the Ohio Supreme Court stated that the outcome of a lawsuit based on the unequal resources available to school districts could not be predicted. To overcome the disparity in property wealth found among school districts, Douglas suggested that all revenue from non-residential property be placed in a state fund.

In summary, two recommendations that would drastically modify the present definition of local revenue capacity are being discussed by policy-makers: (1) Include income as part of local capacity in the state aid formula, and (2) remove non-residential property from local capacity. The purpose of this investigation is to simulate the implementation of these recommendations and analyze the results.

Method

Modifications to Revenue Capacity

This study simulates several modifications to district revenue capacity as used in the Ohio aid formula:

1. Half income and half property. One-half of the average adjusted gross income per household added to one-half assessed property valuation.

2. One-third of the average adjusted gross income per household added to two-thirds assessed property valuation.

3. Income only. Average adjusted gross income per household substituted for assessed property valuation.

4. Assessed valuation of residential and agricultural property added to district share of pooled commercial, industrial, and personal property. All property except residential and agricultural property was subtracted from the district property valuation and placed in a state pool, and the district share of the pooled valuation, apportioned according to the number of pupils, was added to district residential and agricultural property valuation.

5. Assessed valuation of all real property added to the district share of pooled personal property. All personal property was subtracted from the district property valuation and placed in a state pool, and the district share of the pooled valuation was combined with the district real property valuation.

Local Revenue

Only state aid based on different formulations of local revenue capacity was simulated in this study. Local revenue values were generated by a simulation wherein the present definition of local revenue capacity, the assessed valuation of all real and personal property in the district, was used.

The resulting local revenue values were used in each of the alternative simulations.

Data

Data for each of the school districts for fiscal year 1987 were obtained from the Division of School Finance, Ohio Department of Education.

Computer Software

SPSS-X, RATS, and SuperCalc were used to create the simulations.

The Income Measure

If income were simply substituted for property valuation in the foundation formula, the greater difference between local revenue and the foundation level would result in a much larger claim on the state treasury for foundation payments. In an effort to hold total foundation aid distributions at a constant level, the following procedure was used. Average adjusted gross income per household and the number of filed income tax returns were obtained from the Ohio Department of Taxation for each district. The income variable was weighted to adjust for the difference in the value of taxable property and income. For each district, the average income was multiplied by the number of returns filed within the district. These values were added to arrive at a state income value. The sum of district assessed valuations provided assessed valuation for the entire state. The income adjustment factor was produced by dividing state assessed valuation by state income.

Equity Measures

Defining and measuring equity in school finance is a complex undertaking and is subject to considerable disagreement. The framework developed by Berne and Steifel (1984) has been extensively used to focus discussion. We have chosen a preliminary definition of horizontal equity as equal revenue per pupil across the 615 Ohio school districts. The measures chosen for comparison are listed and explained, following the definitions provided by Berne and Steifel (1984).

1. The Range: the highest revenue per pupil minus the lowest revenue per pupil.

2. The Restricted Range: the difference between the revenue per pupil at the 95th percentile and the revenue per pupil at the 5th percentile.

3. Federal Range Ratio: the restricted range per pupil divided by the revenue per pupil at the 5th percentile.

4. Coefficient of Variation: the standard deviation divided by the mean.

5. McLoone Index: the sum of the revenue per pupil necessary to raise the districts with revenues below the median to the median. The closer the McLoone Index is to one, the more equal districts are.

6. Gini Coefficient: measures how close the distribution of districts (e.g., 20 percent) is to per pupil revenues (e.g., 20 percent). The Gini Coefficient is derived from the Lorenz curve.

Effect of Modifying District Revenue Capacity

Since the amount of state aid hinges on local revenue capacity, increased equality of the distribution of state aid indicates a more uniform local revenue capacity found among the districts in the state. The Gini Coefficients in Table 1 decrease in size as income and pooled property are substituted for assessed valuation. Since a Gini Coefficient of zero represents complete equality, the distributions of state aid based on the modifications to revenue capacity are more equal. The substitutions for the present definition of district revenue capacity, then, resulted in greater equality of local revenue capacity.

As seen in Table 2, the Gini Coefficients of the simulations of combined state and local revenue demonstrate increased equity as the alternative measures of local revenue capacity are employed. When income is used to replace assessed valuation, the Gini Coefficient moves downward, indicating increased equity. Similarly, the pooled property simulations demonstrate a further improvement in equity.

If equity is the goal, assessed valuation of property, when compared to the alternatives used in the simulations, is the least desirable definition of local revenue capacity. Modifications to the present definition of local revenue capacity lead to small but significant increases in the equity of the distributions of state aid.

Table 1
Simulation Using Alternative Measures
of Local Revenue Capacity, 1988

Measure	Actual Formula	Income:AV 1:2 Ratio	Income:AV 1:1 Ratio	Pool of Non-Res & Non-Ag Income	Pool of Personal Property	Property
Mean	1,602.50	1,650.94	1,710.22	1,841.13	1,476	1,554
Standard Deviation	536.44	512.16	494.16	469.51	374	430
Maximum	287,765	262,584	244,197	220,441	140,425	185,277
Minimum	2,890	2,932	2,967	3,044	2,659	2,735
Range	103	103	103	84	141	103
Restricted Range	1,872	1,728	1,667	1,561	2,518	2,632
95th/5th Percentile	5.23	4.00	3.43	2.72	2.52	3.12
Federal Range Ratio	.81	.175	.71	.64	.60	.67
Coefficient of Variation	.33	.31	.29	.25	.25	.27
McLoone Index	.58	.61	.64	.68	.68	.64
Gini Coefficient	.18	.17	.15	.13	.14	.15

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